Abstract: P3374

Quantification of mitral valve regurgitation volume by 2D and 3D echocardiography compared with cardiac magnetic resonance: a systematic review and meta-analysis

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Topic(s):
Imaging: Valve Disease

Citation:

Background: Accurate determination of mitral valve regurgitation (MVR) volume as a measure of left ventricular overload is of great clinical importance for timing of valve repair. The reliability of different echocardiographic methods for assessment of severity of MVR, particularly in severe cases, is currently unclear.

Purpose: We sought to shed light on this issue by means of a systematic literature review (SLR) and meta-analysis, in which we combined results of all available published studies comparing the different echocardiographic methods with cardiac magnetic resonance (CMR) as standard reference.

Methods: Electronic databases PubMed and Web of Science were searched for studies examining 2-dimensional (D) and 3D transthoracic and transoesophageal echocardiography (TTE and TEE), using proximal isovelocity surface area (PISA) and volumetric methods and comparing these with CMR. Estimated mean bias with limits of agreements (LoA) derived from Bland-Altman tests and correlations coefficients (R) were pooled together using a weighted inverse variance method.

Results: Twenty prospective studies were eligible for meta-analysis. Overall 1187 patients with primary or secondary, mild to severe MVR were included. The mean age was 59±13 years and male gender constituted 678 (57%) of patients. Meta-analysis of bias and LoA comparing all echocardiographic methods with CMR showed moderate overestimation and poor agreement with a bias and LoA of 8.24 (−3.55, 20.03) ml, and moderate correlation with R=0.74 (0.70–0.78) p<0.001, Fig 1. 3D-PISA followed by 3D-volumetric methods showed better agreement with an underestimation of −3.20 (−12.33, 5.92) ml, R=0.84 (0.78–0.89) p<0.001 and overestimation of 4.61 (−10.17, 19.39) ml, R=0.90 (0.86, 0.94) p<0.001, respectively. 2D volumetric method showed the poorest agreement with a bias and LoA of 23.56 (−4.19, 51.31) ml, and a moderate correlation with R=0.64 (0.54–0.73), p<0.001. In 172 patients with severe degree of MVR, echocardiographic techniques (2D and 3D) were able to correctly quantify regurgitation severity only in 114 (66%) of cases.

Conclusions: Echocardiographic methods either under- or overestimate the severity of MVR volume, however, 3D-PISA seems to be more reliable. CMR should be considered particularly in cases of severe MVR where a decision-making prior to valve surgery deems necessary. Powerful randomized studies are needed to further assess the accuracy of different echocardiographic methods in relation to CMR.
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